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PERFORMANCE OF RIO DE JANEIRO STATE WATERSHED COMMITTEES FOR THE PARAÍBA DO SUL RIVER BASIN: CASE STUDY ON SEWAGE-RELATED INITIATIVES.

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Resumo - Este artigo tem por objetivo investigar a atuação dos comitês fluminenses da bacia hidrográfica do rio Paraíba do Sul, quanto aos investimentos em coleta e tratamento de esgoto, entre os anos de 2010 e 2020. Dentre os resultados encontrados, o que mais se destacou foi a dificuldade dos comitês em realizar o desembolso dos valores definidos pela Lei Estadual 5.234/2008, que determina que 70% do valor arrecadado do setor de saneamento seja aplicado em ações de coleta e tratamento de esgoto urbano. Nesse contexto, a pesquisa aprofunda a análise apontando os principais motivos para a não concretização dessas ações, considerando os dados de participação dos municípios e das estratégias adaptativas adotadas pelos comitês de bacia. A pesquisa é qualitativa e exploratória, mediante quatro estudos de caso. Aplicou-se técnicas de pesquisa documental em sítios eletrônicos institucionais.

Palavras-chave: Comitê da Bacia Hidrográfica; Investimento; Esgotamento Sanitário; Recursos Hídricos.

Abstract - This article aims to investigate the performance of four watershed committees (WCs) for the Paraíba do Sul River Basin between 2010 and 2020, regarding investments in sewage treatment in the 57 municipalities of Rio de Janeiro state in the region. It was found that 3 of the 4 WCs do not comply with Rio de Janeiro state law no. 5.234/2008, which stipulates that 70% of funds from the sanitation sector be invested in sewage collection and treatment initiatives. An in-depth analysis was conducted, with a focus on the main reasons for failing to implement these initiatives, based on data regarding municipal participation and adaptive strategies adopted by WCs. The main results centered on poor municipal participation and construction of adaptative strategies. The research is exploratory and qualitative, using four case studies. Documentary research techniques were applied to institutional websites

Keywords: Watershed committee; Investment; Sanitary sewage; Water resources.

1 Introduction

Regulating and generating water resources is a challenge, but the finiteness of this resource and increasing water shortages throughout the 20th century demonstrate the need to address the issue

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and seek means to guarantee its availability. New global guidelines have tended towards shared water management. This so-called water resource governance system is complex, presupposes addressing different interests, and requires compliance with regulation layers and competencies, including water rights, territorial ownership, specific public water policies and basic sanitation.

In Brazil, the National Water Resource Policy (PNRH) of 1997 stipulates that water management should be promoted by Watershed Committees (WCs), consensus-based deliberative bodies formed by water resource users, civil society and the public sector. The jurisdiction of WCs is delimited by the hydrographic region corresponding to the relevant watershed or sub-basin. WC initiatives should promote water sustainability and are funded mainly by water usage fees.

In Rio de Janeiro state, law no. 5.234 of 2008 stipulates that at least 70% of water rates be applied to sewage collection and treatment (in 2023, a law changed this forecast). It is important to note that the WC is responsible for establishing initiatives that will be implemented with the fees collected and its executive agency must apply the resources to implement committee decisions. It is also important to remember that basic sanitation in municipalities falls under the purview of the municipalities themselves and not the WCs.

The study area includes the part of the Paraíba do Sul River Basin located in Rio de Janeiro state, its various watershed-related organizations and the four WCs: Rio dois Rios (R2R); Baixo Paraíba do Sul and Itabapoana (BPSI); Médio Paraíba do Sul (MPS) and Piabanha (PIAB). This region contains 57 municipalities that correspond to 63% of the state. However, only 41% of sewage is treated (CEIVAP, 2018), demonstrating the importance of investigating WC performance in promoting sewage collection and treatment initiatives.

This is qualitative and exploratory research, using a case study. Documental research techniques were applied to institutional websites, collecting data and information about goals, projects and investments, with a view to answering the following questions:

- How are financial resources invested in sewage collection and treatment?
- Are urban sewage investment proposals deliberated in these committees?

The article presents a literature review about the governance of water resources, methodology, results and discussion, addressing particular and common issues in the four watershed committees, and a conclusion is drawn according to the study questions.

2 Literature review

Water is a common resource, essential to maintaining human life. According to McCay (1995) apud Vieira, Berkes, Seixas (2005), common resources (CRs) exhibit two basic characteristics: 1) difficulty excluding or controlling potential user access and 2) subtractability, whereby each user consumes units from a shared resource and is therefore capable of subtracting from the welfare of others.

The challenge of managing non-renewable common resources is addressed in the literature from the standpoint of collective behavior (Olson, 1999), along with characterizing ownership of the asset and who should be responsible for it. Hardin (1968) considered that only two arrangements – centralized government and privatization – could sustain common goods long-term, in addition to presuming that all users were faced with a common dilemma and unable to create solutions.

Hardin´s perspective was criticized by Dietz et al. (2003), who warned against oversimplification of his theory. In this respect, the authors identified other institutional arrangements that promoted common resource conservations. Governance is an alternative to model determinism, where the division between public and private prevents users from finding a sustainable solution.

According to International Federation of Accountants (IFAC) (2001), governance is the structural framework that encompasses the administrative, political, economic, social, environmental and legal dimensions, among others, that are put into practice to guarantee achieving the desired results of stakeholders. Thus, governance signifies a change in the meaning of government, that is, a new process of governing, or a changed condition of ordered rule, or the new method (Rhodes, 1996; Stoker, 1988 apud Matos, Ckagnazaroff, 2015).

Water does not respect the political limits created by man, and its management is considered the most important challenge by the international community (Matos; Chagnazaroff, 2015), and for this reason, governance arrangements have been considered and applied in several countries. Dietz et al. (2003) state that effective governance involves a constant need for information; the ability to deal with conflicts; inducing compliance with rules; providing infrastructure; and being prepared for change.

In the present study, the perspective of Dietz et al. (2003) was used, where efficient governance faces numerous challenges, including rules capable of adjusting to ecological, social, economic and technological development issues. According to Vieira, Berkes, Seixas (2005), the focus of natural resource management must shift towards increasingly diversified institutions, more flexible, adaptive and non-fragile systems. The current governance model implemented in Brazil has been the object of study of several authors such as Lanna (2000); Abers e Jorge (2005); Gutiérrez (2006); Jacobi (2006); Totti (2009); Campos e Fracalanza (2010); Lemos (2010); Abers e Keck (2017).

At the onset of the democratic period, following the military dictatorship, the construction of a new more transparent and decentralized public policy pattern was encouraged, involving greater participation of the population (Totti, 2009). The 1988 Federal Constitution determined that all water bodies were public domains, which means that water use requires a license or an administrative act. However, although water is considered state property under national governance that allows different state regulation arrangements, this does not ensure its sustainable use (Vieira et al., 2005).

Thus, based on the 1988 Federal Constitution and inspired by the French model, Law 9.433 of 1997 created the National Water Resource Policy (PNRH) and the National Water Resource Management System, – which followed the global trend and premises of agenda 21, stipulating integrated water resource management aimed at multiple water uses, decentralized at the watershed and participative level, creating watershed committees and recognizing that water is a vulnerable finite resource for which fees can be charged (Totti, 2009).

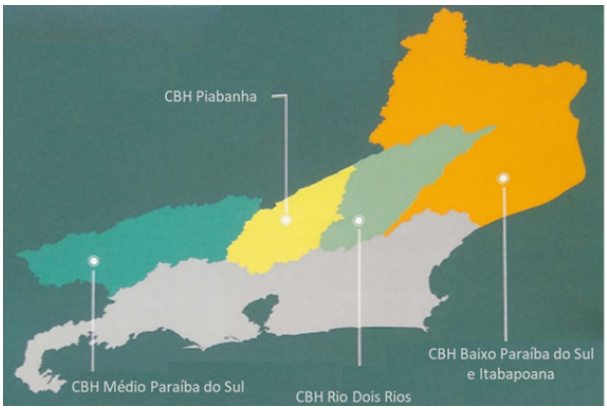
The PNRH instituted water as an economic asset and, according to the law, the financial resources generated by water use fees should be prioritized in the watershed in which they were generated, to finance programs and projects previously included in Water Resource Plans. The aforementioned federal law also stipulated that every state should implement its own Water Resource State Policy. Thus, it is up to state entities to implement their own water management system and its respective management and fee collection instruments.

National and state water resource policies, as well as their instruments, are interdependent and complementary tools. According to Totti (2009), they require technical, political, and institutional skills, because their implementation is above all a social organization process that demands participation and acceptance by stakeholders, with the understanding that there will be a general collective benefit.

In this respect, Rio de Janeiro state developed its Water Resource State Policy in 1999, enacting law no. 3.239, which enabled the creation of management instruments. The governance structure of Rio de Janeiro state contains nine watershed regions with their respective committees, four of which are part of the Federal Paraíba do Sul River Basin and objects of the present study (Figure 1).

It is up to each committee to coordinate the activities of public and private agencies related to water and environmental resources. To that end, they should reconcile the goals and guidelines of the Water Resource State Plan with the peculiarities of its area of operation (Machado, 2006). In this

Figura 1: Watershed regions of Rio de Janeiro state corresponding to the 4 WCs: Piabanha, Rio dois Rios, Médio Paraíba do Sul and Baixo Paraíba do Sul and Itabapoana



Fonte: Revista Quatro Águas

context, Rio de Janeiro state also implemented water use fees to finance committee and water agency operations (state law no. 4.247/03). A fee is considered a mark of a successful policy (Rego, 2012), although it has faced implementation problems (Acselrad et al., 2015).

One of the obstacles was the possibility of nonpayment of state water fees by the basic sanitation sector. As such, state law no. 5.234/08 was created, stipulating that 70% of the fees collected from the sanitation sector must be invested in sewage collection and treatment until 80% of the sewage has been collected and treated in the respective watershed. This ordinance was approved based on a broader pact, namely the Rio de Janeiro State Sanitation Pact (Acselrad et al., 2015).

Given that basic sanitation is deficient, not only in Rio de Janeiro state, but nationwide, and the public sector´s admission of its apparent inability to universalize this service, discussions led to the implementation of a new legal sanitation framework (law no. 14.026/2020), which altered the 2007 law. With this change, the Federal Government´s goal is to achieve universalization by 2033.

According to Souza (2017) sanitation has a broad interface with water management, considering, for example, water collection for treatment, distribution for public supply and sewage discharge into water bodies, which affects public and environmental health, requiring a participative and intersectoral strategic view.

According to the data supplied by the Paraíba River Watershed Plan (2020), 87% of the sewage generated in the watershed is collected, but only 41% is treated, 5% is sent to septic tanks and 8% remains completely untreated. The present study collected data in order to determine how financial resources are applied to sewage collection and treatment, and whether proposed investment in urban sewage is deliberated by the 4 Rio de Janeiro state WCs - Piabanha, Rio dois Rios, Médio Paraíba do Sul and Baixo Paraíba do Sul and Itabapoana.

3 Methodology

In order to answer the questions posed in this study, exploratory and qualitative research was conducted, using four case studies. Documentary and bibliographic research techniques were applied to WC and water agency (AGEVAP) websites, as well as the digital repositories of the National Water Agency (ANA) and State Environmental Institute (INEA), which provide information on urban sewage collection and treatment costs, WC actions, project development stages, among others.

The case study was based on data collected from the governance system on practice guidelines, as well as collective selection and operational rules. Next, conformity was analyzed, that is, whether

project execution mirrored the guidelines. Table 1 shows the scope of the study, attributes, sources, and methodology used.

Tabela 1 – Variables and data sources

RESEARCH SCOPE	DESCRIPTION	VARIABLES	SOURCE AND METHODOLOGY
Governance system	Practice guidelines	Collective selection rules Operational Rules (conformity and adaptation)	Database of WC deliberations; laws and regulations; annual and pluriannual plans.
Stakeholders	Involved directly in implementing initiatives	1 – WCs 2 – Municipalities 3 – Executive agency (implementation)	1 – WC database 2- Edicts 3 – Executive agency database

Source: the authors.

The selected variables were combined with the concepts and perspective of Lima et al. (2014) and divided into dimensions to monitor water resource governance. The present study conducted i) an investigation of the revenue applied to management by a water resource fund, and ii) an analysis of pluriannual plans. The sources proposed in Table 1 served as a data collection guide.

The present study used Table 2 as a methodological roadmap, including the case study of 4 committees specifically regarding financial resources spent on sewage collection and treatment and the performance of these WCs. The initiatives promoted by WCs are shown in their respective “watershed plans”, prepared in 2011, and “management guidebooks” (the the case of the four WCs), as well as in their Pluriannual Application Plans (PAP), which stipulate the municipality and amount of funding allocated to its measures.

Tabela 2 – Governance Dimension

Governance Dimension	Aspects of Governance	What was determined	Suggested indicators	Sources
State Capacities	Financial Resources	Whether a fund for water resource management exists and is operational.	Revenues applied to management by a water resource fund.	Financial execution reports.
		Identifying notes in pluriannual plans regarding resources that will be invested in sewage collection and treatment, considering the priorities of the respective water resource plans.	Execution of resources invested in the pluriannual plan/budget.	Pluriannual plan analysis.
		Planning execution.	Resources transferred between departments and sectors (invested) / planned resources.	Financial execution reports.

Source: Adapted by the authors from Lima, Abrucio, Silva (2014)

4 Results

Information on the amount collected and spent on sewage collection and treatment were obtained from the website of the WCs under study (Pro-Management of the Paraíba do Sul River Basin Waters - AGEVAP), in the Pluriannual Plans, which made it possible to create Table 3 with revenue data and determine compliance with legal provisions regarding minimum investments between 2011 and 2020.

Tabela 3 – Revenue vs. Spending on sewage collection and treatment 2011-2020

WC	Amount spent	Amount that should have been spent on sewage collection and treatment (70% of revenues) between 2011 - 2020
BPSI	R$ 196,000	R$ 5.4 million
MPS	R$ 2.2 million	R$ 5.7 million
PIABANHA	R$ 1.09 million	R$ 5.9 million
R2R	R$ 3.73 million	R$ 4 million

Note: The percentage for 2020 was an average of the preceding years due to the absence of WC data. Source: the authors, based on the online repository of the four WCs.

Considering the aforementioned data, the first finding is that each of the WCs should have invested between 4 and 6 million reais on sewage collection and treatment in order to comply with state law. These values are very low for sewage collection and treatment, given that the sanitation cost for the watershed region is around R$ 1.3 billion (COPPETEC, 2002). Thus, the amount provided for each WC to devise measures against urban waste degradation is insufficient. The low revenue of these committees against the financial estimates required is a significant limitation faced by the 4 WCs.

Another result observed in Table 3 is the lack of investment of the revenue collected, where the amount in 3 of the 4 WCs is far from the 70% stipulated by law. However, it is important to note that Table 3 used only the measures implemented in the period analyzed. With respect to unconcluded activities, R2R is the only WC that complied with the legal minimum percentage. Thus, for a more detailed analysis, Table 4 quantifies WC activities according to their planning stages up to 2020.

Tabela 4 – Sewage collection and treatment activities of the Rio de Janeiro state WCs between 2010 and 2020

WC	Activities concluded	Ongoing activities	Future activities
BPSI	2	3	3
MPS	4	4	3
PIABANHA	2	9	2
R2R	4	1	12

Source: the authors based on the online repository of the four WCs.

Table 4 shows that R2R and MPS WCs concluded the largest number of activities. However, when cross-referencing Table 4 and 3 data raises the following questions: a) what are these activities? b) how are they executed? c) how did the R2R WC spend the amounts collected on the 4 concluded activities? d) how did the MPS WC carry out the same number of actions as R2R without spending the stipulated value?

Between 2007 and 2021, the 4 WCs supported their actions with specific guidebooks for their watershed regions. Through this study, they had access to data on the qualitive-quantitative situation of their watersheds, the estimated cost of their activities, and the processes required for them to improve water quality in their regions.

The minutes of committee meetings demonstrated that the individual WCs opted to follow different paths. In 2020, water agencies were contracted and the WCs (as seen in their resolutions, minutes, and calls for tender) focused on planning and proposals to prioritize their municipalities and establish a resource investment order. This was the first challenge faced by WCs, where each one established criteria to prioritize these municipalities, and after technical criteria approval, launched public tenders where the municipalities of the respective watersheds elected a location to receive the sanitary sewage projects.

Investment in sanitation projects, specifically related to urban sewage collection and treatment, is the first measure proposed in the guidebook of activities carried out in partnership with the four Rio de Janeiro committees, with a view to recovering water quality in their watershed. Given the use of their financial resources to fund projects, the WCs launched regional prioritization calls for tender so that municipalities could be scaled to obtain sanitation plans. Each committee selected and developed their activities, but followed similar paths to execute them.

WCs should act in conjunction with other entities of the water resource system, and with those in charge of basic sanitation services. For this reason, it is important to identify who should receive WC resources. Most of the entities in charge of sewage services in the watershed region of the 4 WCs are public authorities, the municipality, State Water and Sewage Company (CEDAE), or an autonomous municipal department (SAAE – Autonomous Water and Sewage Service), as shown in Table 5.

Tabela 5 – Sewage entities in the watershed regions of the 4 WCs

WC	Number of municipalities	Public authority of the sewage service	Public authority in charge of the sewage service (%)
BPSI	22	20	91%
MPS	19	18	95%
PIABANHA	10	7	70%
R2R	12	11	92%

Source: the authors, based on the online repository of the four WCs, taking 2020 as base year.

These public entities are responsible for basic sanitation services, including urban sewage collection and treatment. The municipalities are an integral part of the 4 WCs, almost totally represented in the assemblies, in either a leading orsubstitute role, and therefore participate in the deliberative process of the WCs.

Municipal participation was based on WC calls for tender. For a sanitation entity to receive financial resources, equal opportunity for competitors must be guaranteed and rules published, which occurs with the launching of calls for tender that interested parties must compete for to secure investments, and comply with certain criteria. The municipalities (main basic sanitation departments) have low participation in these competitons, as demonstrated in Table 6.

Tabela 6 – Edicts of the 4 WCs: number of calls for tender, participants and potential participants.

WC	Number of calls for tenders	Number of municipalities	Number of particicipants	Potential participants
BPSI	1	22	3	3
MPS	2*	19	7	7
PIABANHA	1	10	6	2
R2R	4**	12	10	1

Data: * The MPS WC had one of two calls for tender cancelled due to contingency committee funds in 2016. **The R2R WC joined 3 previous calls for tender into a single resolution (2013, 2014 and 2015).

Source: the authors, based on the digital repository of WCs

The calls for tender proposed by the MPS, R2R and BPSI WCs aimed at prioritizing urban municipal areas to be considered with basic sanitation projects. Although a basic sanitation project is a requirement of the national basic sanitation policy, most municipalities do not have one.

In the case of the R2R WC, ten of the twelve municipalities took part in the competition, a significant number, with coordination between these municipalities and the R2Rb itself. In addition, the region that ranks first in R2R is Cantagalo (the headquarters district), where there is no sewage treatment and only 57% of it is collected. These indices demonstrate the importance of promoting sanitation activities in this region. Of the 12 municipalities in the basin, only Itaocara and Carmo have never participated in calls for tender. All the others have taken part in at least one of the four calls for tender launched (2013, 2014, 2015 and 2019).

Although the BPSI WC call for tenders was launched for the entire watershed region, only three municipalities took part, one of which was eligible for three projects in different urban regions. However, in the qualification phase, where the required documentation is checked on submission, none of the municipalities qualified, but with a new deadline, all were later prioritized to be considered in basic sanitation projects. Nevertheless, of the 22 municipalities in the basin, only 3 submitted proposals. In

regard to the BPSI WC, few results were obtained in terms of sewage collection and treatment. This committee focused on monitoring projects in the watershed, considered a priority given the increase in frequency and intensity of drought and flood events in the region.

Seven municipalities took part in the MPS competition, and all were prioritized. Thus, all the municipalities that submitted a proposal complied with the documental requirements. On the other hand, the region contains 19 municipalities, only one of which was conceded the service. As such, at least 18 municipalities could have competed in the call for tenders, but only 7 participated.

The Piabanha WC was created to address sanitary sewage alternatives and were able to totally finance the project, albeit for a small urban region. Six municipalities participated in the competition, but none initially qualified: four lodged an appeal and only Carmo and Paraíba do Sul were successful and their projects totally funded by the Piabanha WC.

The MPS WC results stood out, and its strategy was to launch calls for tender for construction projects (unlike the other WCs), which allowed it to spend more (since these activities are more costly) and conclude more projects. However, these were isolated and were considered of low impact in reducing watershed waste. In addition, many projects (albeit small) overloaded the watershed agency, preventing it from executing other activities (as declared by representatives of MPS and R2R). In addition to limited financial resources, municipal participation in regional calls for tender published by AGEVAP is low. As demonstrated above, the municipalities of the region frequently do not participate in competitions or when they do, are disqualified for lack of the required documentation.

In addition, during the launch of priority tendering, which began even before 2010 (such as the R2R WC), in 2016, some of these calls for tender were still ongoing or about to be launched, but a factor beyond WC control considerably disrupted committee activities: the contingency of the State Water Resource Fund (FUNDRHI) accounts. Amidst the financial crisis, Rio de Janeiro state seized the state fund aimed at financing the actictivities of the state water resource management system. This resource was only recovered after the Public Ministry ratified a Contract Adjustment Agreement (TAC), where the state committed to pay the seized funds in installments. Only when the financial resources were returned to the WCs were activities able to resume.

The 4 WCs are strongly committed to complying with the legal requirement of investing 70% of the amount collected by the basic sanitation sector from urban sewage collection and treatment. However, a large part of this value has yet to be paid. The following problems have been identified for more than a decade, in relation to basic sanitation in the Paraíba do Sul River Basin: i) the absence of basic and executive projects in potential resource beneficiaries (municipal governments, basic sanitation companies, state entities, among others), and ii) lack of committee capacity to draw up contracts, calls for tender, physical execution, financial measurement and execution, and satisfactory project conclusion within appropriate deadlines (Formiga-Johnson et al (2005); Abers and Keck (2017).

With respect to sewage collection and treatment, the present study found that this reality still exists, but factors that hinder these activities are frequently external to the system, with low municipal participation, lack of documentation and resource contingency from the cost fund. However, it is important to consider that a new governance system is involved, where the rules are being established and implemented concomitantly, and the state entities need to coordinate and collaborate to overcome these challenges, that is, behave like a system. In this respect, Abers e Keck (2017) observed that the formal frameworks to measure the successes and failures of WCs do not always reveal how the process occurs. They typically only determine whether the established agenda, that is, the production of plans and documents, occurred or not.

Analyzing only the revenue-expense ratio of the 4 WCs in the last 10 years in sewage collection and treatment would reveal that a large part was not spent and that activities sometimes take years to implement. For this reason, WCs could be deemed inefficient in spending their resources. However,

although real, these data cannot be analyzed separately from the factors that caused them, since when the factors that resulted in an accumulation of these resources over time are examined more closely, it is evident that WCs and their water agency worked tirelessly to develop the mechanisms and tools that would improve their performance. It was expected that good governance would allow institutions to adapt to complex problems.

WCs have established strategies to deal with external changes and unforeseen events, but still lack suitable infrastructure to improve functioning in terms of water management. In the present scenario, the rules, primarily those that establish basic sanitation investments and activities in the WCs studied here, are not well adjusted to the reality that they face. The 4 WCs have provided basic and executive projects for urban locations in their municipalities, and these investments have occurred slowly, but gradually, demonstrating that this system still needs to be improved.

5 Conclusion

The study demonstrated that the financial resources collected from the use of the watershed water for sewage collection and treatment allowed the WCs to act in conjunction with municipalities in creating sanitation projects. The amount collected and complex implementation and enforcement at a sewage treatment station are beyond the technical, economic, and institutional competencies of a committee.

Notably, it is difficult to spend the amounts collected. In order to promote the use of financial resources, the activities of the four committees studied focused on planning and subsidizing the municipalities with basic and executive sewage projects, but these (mainly those responsible for sewage services) lack a technical team to monitor the projects and obtain the required documentation. In addition, WCs suffer from resource contingency (2016) and must deal with a multitude of challenges.

After determining the trajectory of these WCs in the last decade, with a view to implementing their basic sanitation activities, it was found that internal factors are involved, resulting from the configuration of the system itself and its limitations. These include low financial capacity, but there are also external factors that cannot be predicted or controlled by the institutions, such as financial resource contingency, and the non-participation of municipalities in calls for tender, or their disqualification due to lack of documentation.

In their PAPs (Annual Investment Plan), WCs reserve 70% of the resources collected from the sanitation sector for sewage collection and treatment, as stipulated by law. Thus, the resource is committed, and the main difficulty is in spending these funds. Another problem related to spending is that although there is a spending stipulation in the PAP, the payment itself often only occurs after a company is contracted and as the products are delivered.

Although the scenario is not promising, an important study result is the constant effort of WCs, even when faced with sudden institutional and legal changes, to devise solutions, and develop alternative steps to carry out activities, indicating a concern about adapting the rules and strategies to the changes imposed on them. The following are important characteristics for governance to function: constant adaptation, dealing with changes, and overcoming adversity.

References

ABERS, R.; JORGE, K. D. Descentralização da gestão da água: por que os comitês de bacia estão sendo criados? **Ambiente & Sociedade**, v. VIII, n. 2, p. 1–26, 2005.

ABERS, R.; KECK, M. **Autoridade Prática: ação criativa e mudança institucional na política das águas do Brasil**. 1. ed. [*S. l.*]: Fiocruz, 2017.

ACSELRAD, M. V.; AZEVEDO, J. P. S.; FORMIGA-JOHNSSON, R. M. Cobrança pelo uso da água no Estado do Rio de Janeiro, Brasil (2004–2013): histórico e desafios atuais. **Engenharia Sanitária e Ambiental**, v. 20, n. 2, p. 199–208, 2015.

BRASIL. **Constituição da República Federativa do Brasil**. Brasília, DF: [*s. n.*], 1988. Disponível em: https://www.planalto.gov.br/ccivil_03/constituicao/constituicao.htm.

BRASIL. **Lei nº 9.433, de 8 de janeiro de 1997. Institui a Política Nacional de Recursos Hídricos, cria o Sistema Nacional de Gerenciamento de Recursos Hídricos**. [*S. l.: s. n.*], 1997. Disponível em: http://www.planalto.gov.br/ccivil_03/Leis/l9433.htm.

CAMPOS, V. N. O.; FRACALANZA, A. P. Governança de águas no Brasil: conflitos pela apropriação da água e a busca da integração como consenso. **Revista Ambiente & Sociedade**, v. 18, n. 2, p. 365–382, 2010.

COMITÊ DE INTEGRAÇÃO DA BACIA HIDROGRÁFICA DO RIO PARAÍBA DO SUL – CEIVAP. **Plano de Recursos Hídricos para a Fase Inicial da Cobrança na Bacia do Rio Paraíba do Sul: Diagnóstico da Situação Atual dos Recursos Hídricos**. [*S. l.*], 2002. Disponível em: https://www.ceivap.org.br/downloads/pgrh-re-010-r0-vol1.pdf.

COMITÊ DE INTEGRAÇÃO DA BACIA HIDROGRÁFICA DO RIO PARAÍBA DO SUL – CEIVAP. **Plano Integrado de Recursos Hídricos da Bacia Hidrográfica do Rio Paraíba do Sul**. [*S. l.*], 2021. Disponível em: http://18.229.168.129:8080/publicacoesArquivos/ceivap/arq_pubMidia_Processo_030-2018-RF01.pdf.

DIETZ, T.; OSTROM, E.; STERN, P. C. The struggle to govern the commons. **Science**, v. 302, n. 5652, p. 1907–1912, 2003.

GARRIDO, R. J. S. **Contribuições à cobrança pelo uso da água no Brasil: abordagem econômica e avaliação de preços ótimos vis-à-vis preços praticados na bacia do rio Paraíba do Sul**. 2018. Tese de Doutorado em Economia – Universidade de Brasília. Disponível em: https://repositorio.unb.br/handle/10482/32163.

GUTIÉRREZ, R. A. Comitê Gravataí: Gestão participativa da água no Rio Grande do Sul. **Lua Nova**, n. 69, p. 79–121, 2006.

HARDIN, G. **A tragédia dos comuns**. [*S. l.: s. n.*], 1968. Tradução de Jose Roberto Bonifacio, Professor de Ciência Política e Relações Internacionais da Universidade Gama Filho (UGF). Disponível em: https://aprender.ead.unb.br/pluginfile.php/254123/mod_resource/content/0/A_TRAGEDIA_DOS_COMUNS_por_Garrett_Hardin.pdf.

INTERNATIONAL FEDERATION OF ACCOUNTANTS (IFAC). **Study 13**. [*S. l.*], 2001. Disponível em: https://www.ifac.org/system/files/publications/files/study-13-governance-in-th.pdf.

JACOBI, P. R. Participação na Gestão Ambiental no Brasil: os comitês de bacias hidrográficas e o desafio de fortalecimento de espaços públicos colegiados. *In:* ALIMONDA, H. (ed.). **Los tormentos de la materia: aportes para una ecología política latinoamericana**. Buenos Aires: CLACSO, 2006. p. 169–194. Disponível em: http://bibliotecavirtual.clacso.org.ar/ar/libros/grupos/hali/C7PJacobi.pdf.

JACOBI, P. R.; BARBI, F. Democracia e Participação na Gestão dos Recursos Hídricos no Brasil. **Katal.**, v. 10, n. 2, p. 237–244, 2007.

LANNA, A. E. A inserção da gestão das águas na gestão ambiental. *In:* MUÑOZ, H. (ed.). **Interfaces da gestão de recursos hídricos: desafios da lei das águas de 1997**. 2. ed. [*S. l.*]: Secretaria de Recursos Hídricos, 2000. p. 75–169.

LEMOS, M. C. Informação Técnica e Gestão Participativa de Bacias Hidrográficas no Brasil. *In:* ABERS, R. N. (ed.). **Água e política: atores, instituições e poder nos organismos colegiados de bacia hidrográfica no Brasil**. [*S. l.*]: Annablume, 2010. p. 191–209.

LIMA, A. J. R.; ABRUCIO, F. L.; SILVA, F. C. B. **Governança dos recursos hídricos: proposta de indicador para acompanhar sua implementação**. [*S. l.*]: WWF Brasil: FGV, 2014. Disponível em: https://wwfbrnew.awsassets.panda.org/downloads/wwf_fgv_governanca_dos_recursos_hidricos.pdf.

MACHADO, C. J. S. O mundo da administração pública das águas do estado do Rio de Janeiro segundo o olhar de um antropólogo. **Horizontes Antropológicos**, v. 12, p. 171–190, 2006.

MARTINS, R. C. A construção social da economia política da água. **Sociologia (Lisboa)**, p. 111–130, 2013. Disponível em: https://journals.openedition.org/spp/1335.

MATOS, F.; CHAGNAZAROFF, I. B. Governança e Gestão de Recursos Hídricos: Proposta de Instrumento de Avaliação de proposição política. *In:* THEODORO, H. D.; MATOS, F. (ed.). **Governança e Recursos Hídricos: experiências nacionais e internacionais de gestão**. [*S. l.*]: Editora D'Plácido, 2015.

OLSON, M. **A Lógica da Ação Coletiva: os benefícios públicos e uma teoria dos grupos sociais**. [*S. l.*]: Editora da USP, 1999.

OSTROM, E.; GARDNER, R.; WALKER, J. **Rules, Games, and Common Pool Resources**. Ann Arbor: The University of Michigan Press, 1994.

REGO, V. V. B. S. Reflexões sobre a política estadual de recursos hídricos do Rio de Janeiro a partir da implementação dos Comitês de Bacia Hidrográfica. **Boletim do Observatório Ambiental Alberto Ribeiro Lamego**, v. 6, p. 35–152, 2012.

REVISTA QUATRO ÁGUAS. **Revista Quatro Águas**. Ano III. [*S. l.: s. n.*], Dezembro 2020. Disponível em: https://www.cbhmedioparaiba.org.br/revista/revista-quatro-aguas-2020.pdf.

RIO DE JANEIRO. **Lei nº 3.239, de 02 de agosto de 1999. Institui a política estadual de recursos hídricos**. [*S. l.: s. n.*], 1999. Disponível em: http://alerjln1.alerj.rj.gov.br/CONTLEI.NSF/b24a2da5a077847c032564f4005d4bf2/43fd110fc03f0e6c032567c30072625b.

RIO DE JANEIRO. **Lei nº 4.247 de 16 de dezembro de 2003. Dispõe sobre a cobrança pela utilização dos recursos hídricos**. [*S. l.: s. n.*], 2003. Disponível em: http://alerjln1.alerj.rj.gov.br/CONTLEI.NSF/e9589b9aabd9cac8032564fe0065abb4/6716fa36f132abd183256dff006c88f4?OpenDocument.

RIO DE JANEIRO. **Lei nº 5.234 de 05 de maio de 2008. Altera a Lei nº 4.247, de 16 de dezembro de 2003**. [*S. l.: s. n.*], 2008. Disponível em: https://www.legisweb.com.br/legislacao/?id=158199.

RODRIGUES, R. G. **Fundo Estadual De Recursos Hídricos Do Rio De Janeiro: Diagnóstico Do Seu Funcionamento E Desafios**. 2007. Dissertação em Engenharia – Universidade Federal do Rio de Janeiro.

SOUZA, C. M. N. Gestão da água e saneamento básico: reflexões sobre a participação social. **Saúde e Sociedade**, v. 26, p. 1058–1070, 2017. Disponível em: https://www.scielo.br/pdf/sausoc/v26n4/1984-0470-sausoc-26-04-1058.pdf.

TOTTI, M. E. F. Gestão das águas no Brasil: trajetória e reflexões. **Agenda Social**, v. 3, p. 1–24, 2009.

VICTORINO, V. I. P. Monopólio, conflito e participação na gestão dos recursos hídricos. **Revista Ambiente & Sociedade**, 2003. Disponível em: https://www.scielo.br/j/asoc/a/VVfNYcfxSycHYvfLhQw4dJM/?lang=pt%5C&format=pdf.

VIEIRA, P. F.; BERKES, F.; SEIXAS, C. S. **Gestão Integrada e Participativa de Recursos Naturais: conceitos, métodos e experiências**. [*S. l.*]: Secco/APED, 2005.